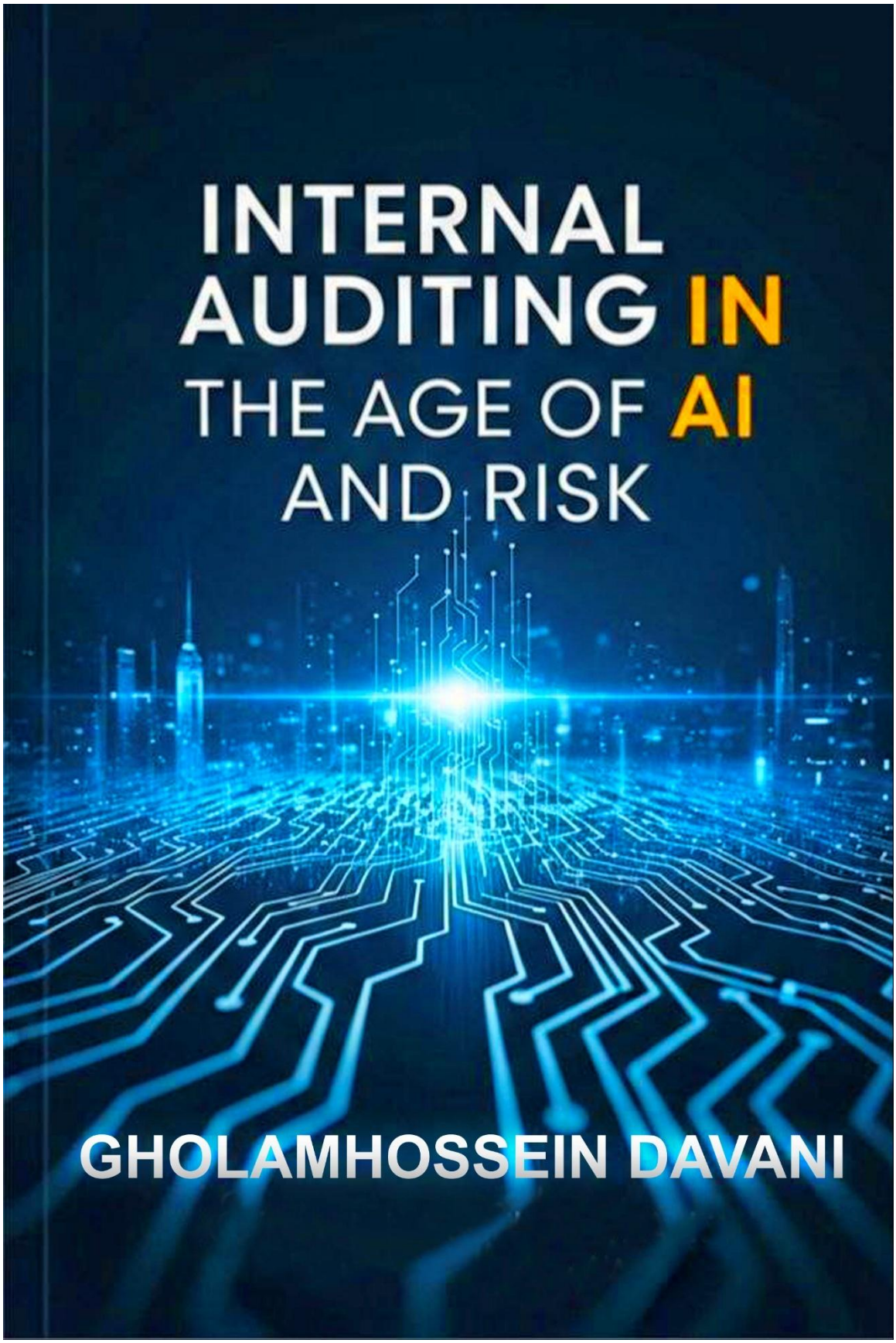
INTERNAL
AUDITING IN
THE AGE OF AI
AND RISK
GHOLAMHOSSEIN DAVANI

Surface:

In today's fast-evolving digital landscape, internal audit functions face unprecedented challenges and opportunities as Artificial Intelligence (AI) reshapes business processes, controls, and risk profiles. This authoritative volume provides an essential framework for internal auditors, Chief Audit Executives (CAEs), audit committees, and governance professionals seeking to understand and effectively oversee AI-enabled environments.

Drawing upon the latest International Professional Practices Framework (IPPF) updates from The Institute of Internal Auditors (IIA), globally recognized auditing standards, and extensive case studies, this book equips readers with:

- Comprehensive knowledge of AI technologies—including machine learning, blockchain, cloud computing, and evolutionary algorithms—and their impact on audit and assurance practices
- Practical methodologies for evaluating AI governance, ethical compliance, risk management, and data integrity
- Insightful analysis of corporate governance models across jurisdictions (US, UK, EU, Asia) with special attention to AI-related regulatory trends
- Detailed competency frameworks and training strategies from leading audit firms to prepare auditors for the AI age
- Real-world case workshops addressing credit scoring risk, fraud prevention, and audit committee effectiveness

A strategic resource for audit professionals committed to driving innovation, enhancing governance, and safeguarding organizational integrity in an AI-driven world.

Acknowledgments

This book represents the culmination of extensive research, collaboration, and the support of many dedicated individuals and organizations. I would like to express my sincere gratitude to The Institute of Internal Auditors (IIA) for their ongoing commitment to advancing the internal audit profession and for providing invaluable guidance through their updated International Professional Practices Framework.

I am deeply thankful and special gratitude and appreciation to Mr. Hossein Abadi, my high school teacher, whose strictness enabled me not only to study diligently but also to become an eloquent speaker and skilled writer.

Special thanks go to my colleagues, industry experts, and audit professionals who generously shared their insights, case studies, and experiences in navigating the complex intersection of AI and internal auditing. Their practical knowledge has enriched this work immeasurably.

I am also grateful to the leaders and trainers of the Big Four audit firms for their transparency and dedication to developing the competencies of future auditors in the digital era.

Finally, I extend my heartfelt appreciation to my family and mentors for their unwavering support and encouragement throughout this journey.

This book is dedicated to all internal auditors who strive to uphold integrity, innovation, and excellence in the rapidly evolving landscape of the digital economy.

Contents

Chapter 1: Introduction & Objectives 16
1.1 Overview 16
1.2 The New Definition of Internal Audit (IIA 2024) 16
1.3 The Evolution of Internal Auditing 17
1.4 The Role and Scope of Internal Auditing 17
1.5 Governance, Risk Management, and Control 18
1.6 Future Directions: Trends and Innovations in Auditing 19
1.7 Building a Career in Internal Auditing: Pathways and Qualifications 20
1.8 Objectives of This Book 20
1.9 The Transformative Role of Technology in Internal Audit 23
1.10 Why Internal Audit Matters in the AI Age 24
1.11 Evolution from Internal Control to Internal Audit 25
1.12 What Are the Global Internal Audit Standards™? 26
1.13 Case Study: Resume Screening and Algorithmic Bias 36
1.14 Summary 37
1.15 Review Questions 37
1.16 Further Reading 38
Chapter 2: Foundations of Artificial Intelligence and Emerging Audit Technologies 39
2.1 Introduction 39
2.2 What is Artificial Intelligence? 39
2.3 Types of AI 39
2.4 Machine Learning and Its Audit Implications 40
2.5 Natural Language Processing (NLP) 40
2.6 Robotic Process Automation (RPA) in Audit 41
2.7 Blockchain Technology and Internal Audit 41
2.8 Cloud Computing and Audit Considerations 41
2.9 Emerging Technologies in Internal Audit 42
2.10 The Role of Metaverse, Remote Work, Home Office, Any Desk,Team Viewer , zoom . 42
2.11 Role of Power BI in Internal Audit 45
2.12 Role of Python in Internal Audit 46
Final Thoughts about Power BI - Python 47

2.13 Sample several casesPower BI and Python in internal auditing 48
2.14 Compliance, Ethics, and Governance in Virtual Audit Environments..... 51
2.15 Future Outlook: Integrating AI with Remote and Virtual Auditing..... 51
2.16 Challenges in Auditing AI Systems 52
2.17 Skills Required for Auditing AI and Emerging Technologies 53
2.18 Regarding the Prevention of Fraud and Corruption by Stakeholders' Expectations ... 53
2.19 Summary..... 56
2.20 Review Questions..... 56
2.20 Further Reading..... 57
Chapter 3: Risk and Governance of Artificial Intelligence Systems 58
3.1 Introduction..... 58
3.2 AI-Related Risk Categories..... 58
3.3 Model Risk Management 59
3.4 Data Governance for AI..... 59
3.5 Ethical Considerations in AI 59
3.6 Cybersecurity Risks in AI Systems..... 60
3.7 Operational Risks and Business Continuity..... 60
3.8 Regulatory and Legal Environment for AI 60
3.9 AI Governance Frameworks..... 61
3.10 Role of Audit Committees and Boards 61
3.11 Best Practices in AI Risk Mitigation 62
3.12 Providing Assurance on Organization Fraud Risk Governance and Management 62
3.13 Case Study: AI Risk and Governance in a Healthcare Provider 69
3.14 Summary..... 69
3.15 Review Questions..... 70
3.16 further Reading..... 70
Chapter 4: Auditing AI Algorithms and Model Validation..... 72
4.1 Introduction..... 72
4.2 Understanding AI Algorithms 72
4.3 Importance of Algorithm Transparency..... 73
4.4 Model Development Life Cycle 73
4.5 Model Validation Techniques..... 74

4.6 Testing for Bias and Fairness *74*
4.7 Validation of Training Data Quality *75*
4.8 Independent Model Validation *75*
4.9 Monitoring and Maintenance of AI Models *75*
4.10 Challenges in Auditing AI Models *76*
4.11 Regulatory Expectations for Model Validation *76*
4.12 Tools and Technologies for AI Audit *76*
4.13 Case Study: Auditing an AI Credit Scoring Model *77*
4.14 Summary *77*
4.15 Review Questions *77*
4.16 Further Reading *78*
Chapter 5: Data Governance and Data Quality in AI Auditing *79*
5.1 Introduction *79*
5.2 The Importance of Data Governance for AI *79*
5.3 Components of Data Governance Frameworks *79*
5.4 Data Quality Dimensions Relevant to AI *80*
5.5 Data Collection and Preparation *81*
5.6 Data Privacy and Ethical Considerations *81*
5.7 Tools and Technologies for Data Governance and Quality *81*
5.8 Challenges in AI Data Governance and Quality *82*
5.9 Role of Internal Audit in Data Governance for AI *82*
5.10 Specialized Technology Courses for Internal Auditors *82*
5.11 Case Study: Enhancing Data Governance for AI in Healthcare *85*
5.12 Summary *86*
5.13 Review Questions *86*
5.14 Further Reading *87*
Chapter 6: AI Risk Management and Control Frameworks *88*
6.1 Introduction *88*
6.2 Understanding AI Risks *88*
6.3 Risk Management Frameworks for AI *89*
6.4 Components of AI Control Frameworks *89*
6.5 Risk Identification in AI *90*

6.6 Risk Assessment Techniques 90
6.7 Risk Mitigation Strategies 91
6.8 Continuous Monitoring and Reporting 91
6.9 Internal Auditor's Role in AI Risk Management 91
6.10 Case Study: Risk Management in AI-Driven Financial Services 92
6.11 Summary 92
6.12 Review Questions 92
6.13 Further Reading 93
Chapter 7: AI Governance and Ethical Considerations 94
7.1 Introduction 94
7.2 Understanding AI Governance 94
7.3 Ethical Challenges in AI 95
7.4 AI Ethical Principles and Frameworks 95
7.5 Developing an AI Governance Framework 96
7.6 Explainable AI (XAI) 96
7.7 AI Regulation and Compliance 97
7.8 Role of Internal Audit in AI Governance 97
7.9 Challenges in Implementing AI Governance 98
7.10 Case Study: Ethical AI in Financial Services 98
7.11 Summary 98
7.12 Review Questions 99
7.13 Further Reading 99
Chapter 8: AI Risk Management in the Banking Sector 100
8.1 Introduction 100
8.2 Understanding AI Risks in Banking 100
8.3 AI Risk Management Frameworks 101
8.4 Model Risk Management (MRM) for AI 101
8.5 Data Governance and Quality 102
8.6 Cybersecurity Risks in AI Systems 102
8.7 Regulatory and Compliance Risks 102
8.8 Integrating AI Risk Management into ERM 103
8.9 Tools and Technologies for AI Risk Management 103

8.10 Internal Audit's Role in AI Risk Management 104
8.11 Challenges and Future Trends 104
8.12 Summary 104
8.13 Review Questions 105
8.14 Further Reading 105
Chapter 9: Comparative AI Regulation and Governance in Banking: US, UK, EU, Asia 106
9.1 Introduction 106
9.2 Regulatory Landscape Overview 106
9.3 Comparative Table of AI Regulation and Governance in Banking 107
9.4 United States Regulatory Environment 109
9.5 United Kingdom Regulatory Framework 109
9.6 European Union's Comprehensive Approach 110
9.7 Asia: Diverse Approaches in China, Japan, and Singapore 110
9.8 Implications for Internal Audit and Governance 111
9.9 Case Example: Cross-Border AI Risk in Credit Scoring 111
9.10 Summary 112
9.11 Review Questions 112
9.12 Suggested Future Reading 112
Chapter 10: Regulatory Compliance and Governance of AI in Banking 113
10.1 Introduction 113
10.2 The Regulatory Landscape for AI in Banking 113
10.3 Key Regulatory Requirements Impacting AI in Banking 114
10.4 Governance Structures for AI Compliance 115
10.5 Challenges in AI Regulatory Compliance 115
10.6 Best Practices for AI Regulatory Compliance 116
10.7 Role of Internal Audit in AI Compliance Governance 116
10.8 Case Study: AI Regulatory Compliance Framework in a Global Bank 117
10.9 Future Trends in AI Regulation and Governance 117
10.10 Summary 118
10.11 Review Questions 118
10.12 Further Reading 118
Chapter 11: Internal Audit of AI Systems in the Banking Industry 120

11.1 Introduction *120*
11.2 The Role of Internal Audit in AI Governance *120*
11.3 Key Risks Associated with AI in Banking *121*
11.4 Audit Planning and Scoping for AI Systems *121*
11.5 Audit Methodologies and Techniques *122*
11.6 Control Areas to Evaluate *122*
11.7 Challenges in Auditing AI Systems *123*
11.8 Case Study: AI Audit in Credit Risk Management *123*
11.9 Future Trends in AI Auditing *124*
11.10 Summary *124*
11.11 Review Questions *124*
11.12 Suggested Future Reading *125*
Chapter 12: Regulatory Compliance and AI in the Banking Industry 126
12.1 Introduction *126*
12.2 Regulatory Environment for AI in Banking *126*
12.3 Key Regulations and Guidelines *127*
12.4 Compliance Challenges for Banks Using AI *128*
12.5 The Role of Compliance Functions in AI Governance *128*
12.6 AI Regulatory Impact Assessments *128*
12.7 Cross-Border Regulatory Considerations *129*
12.8 Case Study: Regulatory Compliance in AI-Based Fraud Detection *129*
12.9 Future Trends in AI Regulation for Banking *130*
12.10 Summary *130*
12.11 Review Questions *130*
12.12 Suggested Future Reading *131*
Chapter 13: AI Auditing Tools and Techniques for Internal Audit 132
13.1 Introduction *132*
13.2 The Need for AI Tools in Auditing *132*
13.3 Key AI Tools for Internal Audit *132*
13.4 Techniques for Auditing AI Systems *135*
13.5 Challenges in Auditing AI *135*
13.6 Case Study: Using AI Tools for Fraud Detection *136*

13.7 Summary *137*
13.8 Review Questions *137*
13.9 Suggested Further Reading *137*
Chapter 14: Risk Management in AI-Driven Auditing *139*
14.1 Introduction *139*
14.2 The Changing Risk Landscape in AI-Enhanced Auditing *139*
14.3 Key Risk Categories in AI-Driven Auditing *140*
14.4 Real-World Cases of AI-Related Risks in Auditing *141*
14.5 Risk Assessment Approaches for AI in Auditing *142*
14.6 Risk Mitigation Strategies *143*
14.7 Emerging Regulatory Landscape *143*
14.8 Summary *144*
14.9 Review Questions *144*
14.10 Suggested Further Reading *145*
Chapter 15: Internal Audit, COSO and the Four Lines of Defense Against Fraud *146*
15.1 Introduction *146*
15.2 Definition and Purpose of Internal Audit *146*
15.3 The COSO Framework: Overview and Relevance to Internal Audit *147*
15.4 COSO Enterprise Risk Management (ERM) Framework *148*
15.5 Fraud Risks and Internal Audit *148*
15.6 The Four Lines of Defense Model *148*
15.7 Internal Audit's Role in Fraud Prevention and Detection *149*
15.8 Case Study: Internal Audit Uncovers Payroll Fraud *150*
15.9 COSO Internal Control Components and Fraud Risk Guide for Internal Auditors *151*
15.10 Summary *152*
15.11 Review Questions *152*
15.12 Suggested Further Reading *153*
Chapter 16: 5Cs (CS5) Model *154*
16.1 Introduction *154*
16.2 Usage Context *154*
16.3 Historical Background: *155*
16.4 Why Was the 5Cs Model Developed? *155*

16.5 What is the CS5 Report Used for in Internal Auditing? *155*
16.6 Main Applications of the CS5 Report in Internal Audit *156*
16.7 Practical Audit Mapping Example *157*
16.8 Fundamental Differences Between COSO and 5Cs Models *158*
16.9 Conceptual Mapping Between COSO and 5Cs *158*
16.10 Analytical Conclusion *159*
16.11 Integrated Risk Matrix: COSO Framework + 5Cs Model *159*
16.12 Summary *161*
16.13 Review Questions *161*
16.14 Suggestions for Further Reading *162*
Chapter 17: Audit Models and Frameworks Used by the Big Four Firms 163
17.1 Introduction *163*
17.2 Deloitte's Audit Approach and Models *163*
17.3 PwC's Audit Models and Frameworks *164*
17.4 Ernst & Young (EY) Audit Methodologies *164*
17.5 KPMG's Audit and Advisory Frameworks *165*
17.6 Comparative Overview of Big Four Audit Models *166*
17.7 How Big Four Customize Models for Clients *166*
17.8 Case Study: PwC's Use of COSO and Aura for a Financial Institution *166*
17.9 Summary *167*
17.10 Review Questions *167*
17.11 Suggested Further Reading *167*
Chapter 18: Famous Internal Audit Cases Involving the Big Four and the IIA 169
18.1 Introduction *169*
18.2 The Role of the Big Four in Famous Corporate Audits *169*
18.3 Case Study 1: Deloitte and the Lehman Brothers Collapse (2008) *169*
18.4 Case Study 2: PwC and the Satyam Scandal (India, 2009) *170*
18.5 Case Study 3: EY and the Tesco Accounting Investigation (UK, 2014) *170*
18.6 Case Study 4: KPMG and the Carillion Collapse (UK, 2018) *171*
18.7 The Institute of Internal Auditors (IIA) and Its Role in High-Profile Cases *171*
18.8 Additional Famous Cases Featuring Internal Audit Challenges *171*
18.9 Summary *172*

18.10 Review Questions *172*
18.11 Suggested Further Reading *173*
Chapter 19: The Role of Audit Committees in AI and Corporate Governance *174*
19.1 Introduction *174*
19.2 Background and Purpose of Audit Committees *174*
19.3 SEC and PCAOB Requirements in the United States *175*
19.4 Global Experiences and Variations *175*
19.5 The Audit Committee's Role in AI Governance *176*
19.6 Internal Audit and Audit committee in Iran *177*
19.7 Case Study: AI Risk Oversight in a Financial Institution *182*
19.8 Challenges for Audit Committees *182*
19.9 Summary *183*
19.10 Review Questions *183*
19.11 Suggested Further Reading *183*
Chapter 20: Internal Controls for AI Systems *185*
20.1 Introduction *185*
20 .2 The Need for Internal Controls in AI Systems *185*
20.3 Types of Internal Controls for AI Systems *186*
20.4 Internal Control Frameworks Adapted for AI *187*
20.5 Relationship Between Internal Controls, Internal Audit, and Audit Committees in the AI Context *188*
20.6 Case Study: AI Model Governance Failure and Audit Committee Intervention *189*
20.7 Summary *190*
20.8 Review Questions *191*
20.9 Suggested Further Reading *191*
Chapter 21: Corporate Governance in the Age of AI *192*
21.1 Introduction *192*
21.2 Corporate Governance Models: Anglo-American vs. European *192*
21.3 Comparative Analysis: US, UK, EU, Japan, and Germany *193*
21.4 Corporate Governance Compliance Listed Co. in Stock Market Listed Companies *193*
21.5 Role of Women in Corporate Governance: The Nordic Model *194*
21.6 Corporate Governance and Internal Audit in AI Governance *195*
21.7 Summary *195*

21.8 Review Questions *196*
21.9 Suggested Further Reading *196*
Chapter 22: ESGED to ESG – Auditing Environmental, Social, and Governance *198*
22.1 Introduction to ESGED *198*
22.2 From ESGED to ESG: The Evolution *199*
22.3 Practical ESG Auditing Tools and AI Integration *199*
22.4 ESG Audit Methodologies *201*
22.5 ESG and IFRS S1/S2: A Deep Dive *202*
22.6 ESG Disclosure Challenges *202*
22.7 Women and ESG Governance *203*
22.8 ESG Assurance in the Insurance Sector: A Case Study *203*
22.9 ESG Integration with Enterprise Risk Management (ERM) *204*
22.10 Summary *204*
22.11 Review Questions *205*
22.12 Suggested Readings *205*
Chapter 23: Workshop Case – Credit Scoring and Risk Control *206*
23.1 Introduction *206*
23.2 Case Background: NovaBank *206*
23.3 Audit Objective *207*
23.4 Key Audit Procedures *207*
23.5 Audit Findings *208*
23.6 Audit Committee Engagement *208*
23.7 Lessons Learned *208*
23.8 Summary *209*
23.9 Review Questions *209*
23.10 Suggested Further Reading *209*
Chapter 24: Competency Needs for AI-Age Auditors *210*
24.1 Introduction *210*
24.2 Shifting Landscape of Audit Competencies *210*
24.3 New Roles for AI-Age Auditors *211*
24.4 The Big Four: Preparing Future Auditors *211*
24.5 Institutional Implications *213*

24.6 Summary *213*
24.7 Review Questions *213*
24.8 Suggested Further Reading *214*
Chapter 25: Comprehensive Checklist: SOX, COSO & Internal Auditor Compliance 215
25.1 introduction *215*
25.2 Sarbanes-Oxley Act (SOX) Compliance Checklist *216*
25.3 COSO 2013 Internal Control Framework Checklist (All Sectors) *216*
25.4 Corporate Governance (CG) Compliance Checklist *217*
25.5 Sustainability Accounting Report Audit Checklist *217*
25.6 Internal Audit Recommendations for AI Systems *218*
25.7 Sample AI-Related Audit Workpaper – AI Revenue Recognition System *218*
25.8 AI-Enabled Risk-Control Matrix (RCM) – Internal Audit Use (All Sectors) *219*
25.9 Sample Risk-Control Matrix (RCM) *219*
25.10 Sample Audit Workpaper Template *219*
25.11 Internal Auditor's Responsibilities Checklist (All Sectors) *220*
25.12 Integration of SOX and COSO in the Banking Sector *220*
25.13 Summary *221*
25.14 Review Questions *221*
25.15 Suggested Further Reading *222*
Chapter 26-Samples Internal Auditing Reporting 223
26.1 Sample Internal Audit Report Findings *223*
26.2. Environmental, Social, and Governance (ESG) Practices *226*
26.3 Report on Corporate Governance (CG) *227*
26.4 Report of Internal Controls Over HR Processes *228*
26.5 HR Internal Controls Audit Checklist *230*
26.6 Detailed Explanation for HR Internal Controls Audit Checklist *232*
26.7 Summary of Internal Audit Findings and Recommendations – H1 2025 ..... *235*
26.8 Sample Audit Committee Report to the Board of Directors *237*
26.9 Special Audit Committee Report to the Board of Directors *240*
26.10 Summary *244*
26.11 Review Questions *245*
26.12 Suggested Further Reading *245*

Chapter 27: Internal Audit in Iran and the Middle East – Challenges and Opportunities 247
27.1 Introduction 247
27.2 The Status of Internal Auditing in Iran 247
27.3 Regional Comparison: Iran ,Saudi Arabia, UAE, and Qatar 248
27.4 Cultural and Regulatory Barriers 248
27.5 AI and Digital Audit Transformation: Regional Outlook 248
27.6 Opportunities for Advancement 249
27.7 Summary 249
27.8 Review Questions 250
27.9 Suggested Further Reading 250
Chapter 28: The Future of Internal Audit – Vision 2035 252
28.1 Introduction 252
28.2 Key Trends Shaping Internal Audit to 2035 252
28.3 Evolution of the Auditor's Role 253
28.4 Future Internal Audit Scenarios 253
28.5 Required Competencies by 2035 254
28.6 Strategic Recommendations for Audit Functions 254
28.7 Summary 254
28.8 Review Questions 255
28.9 Suggested Further Reading 256
Appendix A: Practical Checklists for Internal Audit in the AI Era 257
Appendix B: Comparative Tables – Global Internal Audit Frameworks and Practices ... 259
References and Further Reading 262